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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/595,415	06/16/2000	Hitoshi Seki	9651/4017	1580
757	7590	08/23/2006	EXAMINER	
BRINKS HOFER GILSON & LIONE P.O. BOX 10395 CHICAGO, IL 60610			AHMED, SHAMIM	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 08/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/595,415	<b>Applicant(s)</b> SEKI ET AL.	
	<b>Examiner</b> Shamim Ahmed	<b>Art Unit</b> 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 August 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,4-12 and 17-27 is/are pending in the application.
- 4a) Of the above claim(s) 4-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,17-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/4/06 has been entered.

### ***Response to Arguments***

2. Applicant's arguments filed 8/4/06 have been fully considered but they are not persuasive. Applicants argue that Mueller et al do not teach an anisotropic copper etching composition that satisfies the limitations of the independent claims.

In response, examiner states that the claims are directed to a **composition** not an intended use of the composition and since the Mueller et al's slurry composition includes all the constituents as the claimed composition including the same oxidizing agent, which is capable of etching the substrate anisotropically.

Applicants also argue that Ernst does not suggest the use of a composition consisting essentially of acetic acid with potassium hydrogen peroxomonosulfate.

In response, examiner states that the primary reference Mueller et al already teach the use of acetic acid with potassium hydrogen peroxomonosulfate (claimed oxidant) except the claimed concentration.

Ernst is applied to show introduction of acetic acid with claimed concentration range to stabilize an oxidizing composition (see the rejection).

Therefore, one of ordinary skilled in the art at the time of claimed invention to employ Ernst's teaching into Mueller et al for improved etching with better stabilization of the oxidizing agent assuming similar oxidizing reaction mechanism.

As to Condra et al and Kubotera et al, applicant's argue that they fail to disclose an anisotropic copper etching agent consisting essentially of acetic acid with potassium hydrogen peroxomonosulfate.

In response, examiner states that the argument is not persuasive because modified Condra et al's composition is capable of etching the substrate anisotropically as the composition having same oxidizing agent.

Furthermore, the claims are directed to a **composition** not an intended use of the composition and the phrase "consisting essentially of" is not limited to only acetic acid and potassium hydrogen peroxomonosulfate.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

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were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1 and 17- 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mueller et al (5,958,288) in view of Ernst (3,869,401).

Mueller et al disclose a composition for polishing or etching copper comprising an aqueous solution of an oxidizing agent, wherein the oxidizing agent is monopersulfate such as potassium hydrogen peroxomonosulfate ( $\text{KHSO}_5$ ) (col.4, lines 26-31 and lines 66-col.5, lines 17).

Mueller et al also disclose that the concentration of the oxidizing agent is in the range of about 0.5 to about 50.0 weight percent, which reads on the claimed range of about 0.08 to about 2.0 mol/L (col.5, lines 18-20).

Mueller et al teach that an additive such as acetic acid can be added to the aqueous solution to stabilize the oxidizer (col.7, lines 43-48).

Mueller et al remain silent about the specific concentration range of acetic acid.

However, Ernst teaches a stabilized acidic oxidizing solution, which is well known in the dissolution of metals in etching applications (col.1, lines 8-14).

Ernst also teach that the composition includes acetic acid having a concentration range of about 30 to 85 percent and which range works better to stabilize the oxidizing composition (col.3, lines 43-49).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Ernst's teaching of the preferred acetic acid concentration range into Mueller et al's composition for improved metal etching composition with better stability as taught by Ernst.

Additionally, it would have been obvious to ordinary skilled in the art at the time of claimed invention to optimize the acetic acid concentration, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Mueller et al teaches the polishing rate of the metal layer is maintained at a substantially high rate by controlling decomposition of the oxidizing agent (col.7, lines 51-56).

Therefore, it would have been obvious that the copper layer is etched or removed at an approximately uniform rate.

As to claims 17-19, it would have been obvious the modified slurry composition is capable of selectively etched/removed because the modified etching composition is similar as the invented composition.

As to the new claims 20-22, the etching solution is used **for** anisotropically etching a copper layer having a mask pattern, which limitation is **an intended use of the solution** and are given little weight when determining patentability. See *Corning Glass works Vs. Sumitomo electronic USA, Inc.*, 868 Fd 1251, 1257,9 USPQ 2d 1962, 1966 (Fed. Cir. 1989).

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Modified Mueller's composition having the exact same oxidizing agent and acetic acid (see above) as the invented ones and expected to have the same result such as the etch uniformity.

Similar analysis goes to the claims 23-26, as the future intended use of the composition for etching a copper layer with specific thickness or the copper layer comprises a gate electrode or a wiring layer are not given patentable weight because the exact same composition is capable of doing the same and further more, a product or a composition is what it is, not what it does.

6. Claims 1 and 17-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Condra et al (5,259,979) in view of Kubotera et al (4,297,436) and Ernst (3,869,401).

Condra et al disclose a process and a composition for micro etch cleaning of copper, wherein the composition comprises peroxygen compounds of preferred oxidizing agent such as sodium or potassium monopersulfate ( $\text{KHSO}_5$ ) or sodium or potassium peroxydisulfate (col.1, lines 6-9 and col.6, lines 54-64).

Condra et al fail to teach the exact range of oxidizing agent and also fail to teach the introduction of acetic acid and also fail to teach the concentration of the peroxycompound.

However, Kubotera et al disclose a composition of an etch-bleaching solution comprising oxidizing agent such as peroxy compounds and an organic acid such as acetic acid for promoting the etching action (col.13, lines 22-39).

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Kubota et al also disclose the oxidizing agent is conventionally used in an amount of from about 0.01 to about 10% by weight of the etch-bleaching solution (col.13, lines 22-38).

So, Kubota et al teach that the concentration of the oxidizing agent of about 10% overlaps the claimed lower range of about 10.01% because it has been held that the claimed ranges overlap or lie inside ranges disclosed by the prior art is a prima facie case of obviousness. See *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Therefore, it would have been obvious to one skill in the art at the time of claimed invention to employ Kubotera et al's teaching into Condra et al's method for easily etching of copper by promoting the etching action as taught by Kubotera et al.

Modified Condra et al remain silent about the specific concentration range of acetic acid.

However, Ernst teaches a stabilized acidic oxidizing solution, which is well known in the dissolution of metals in etching applications (col.1, lines 8-14).

Ernst also teach that the composition includes acetic acid having a concentration range of about 30 to 85 percent and which range works better to stabilize the oxidizing composition (col.3, lines 43-49).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Ernst's teaching of the preferred acetic acid concentration range into Modified Condra et al's composition for improved metal etching composition with better stability as taught by Ernst.



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As to the new claims 20-22, the etching solution is used **for** anisotropically etching a copper layer having a mask pattern, which limitation is **an intended use of the solution** and are given little weight when determining patentability. See Corning Glass works Vs. Sumitomo electronic USA, Inc., 868 Fd 1251, 1257,9 USPQ 2d 1962, 1966 (Fed. Cir. 1989).

Therefore, modified Condra et al's composition is capable of selectively etching copper.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Shamim Ahmed  
Primary Examiner  
Art Unit 1765

SA  
August 20, 2006